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SHELL OIL COMPANY
P O BOX 2463
HOUSTON, TX 772522463

EXAMINER
SAINT SURIN, JACQUES M

ART UNIT	PAPER NUMBER
2856	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/821,767	MYERS ET AL.	
	Examiner	Art Unit	
	Jacques M. Saint-Surin	2856	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *11 January 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-15,17-30 and 34-75* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *49-63* is/are allowed.

6)☒ Claim(s) *1-15* is/are rejected.

7)☒ Claim(s) *13, 19, 40 and 48* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

Response to Amendment

1. This Office Action is responsive to the amendment of 01/11/07.

Response to Arguments

2. Applicant's arguments with respect to claims 1-75 have been considered but are moot in view of the new ground(s) of rejection.

3. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claim Rejections - 35 USC § 102

4. Claims 1, 4-5, 20-21, 23 and 25 are rejected under 35 U.S.C. 102(e) as being anticipated by Yogeswaren (US Patent 7,075,215 B2).

Regarding claims 1 and 20, Yogeswaren discloses an acoustic measurement tool (100) comprising :

a chamber (pipe 105) for holding the fluid (col. 4, line 49);

a transmitter (120) positioned within the chamber (105) for transmitting an acoustic signal through the fluid (4);

a reflector (160) positioned within the fluid (105) for reflecting the acoustic signal;

and a receiver (160) positioned within the chamber (105) for detecting a reflection of the acoustic signal;

wherein said apparatus is incorporated in a downhole sampling (100).

Regarding claim 20, it is similar in scope with claim 1 and therefore, it is rejected for the reasons set forth for that claim. Furthermore, Yogerswaren discloses acoustic

measurement tool 100 includes a substantially cylindrical tool collar 110 configured for coupling to a drill string (e.g., drill string 30 in FIG. 1) and therefore typically, but not necessarily, includes threaded end portions 72 and 74 for coupling to the drill string. Through pipe 105 provides a conduit for the flow of drilling fluid downhole, for example, to a drill bit assembly (e.g., drill bit 32 in FIG. 1).

Regarding claim 4, Yogeswaren discloses with continued reference to FIG. 7, backing layer 160 typically includes a composite material having a mixture of one or more elastomeric polymer materials (e.g., rubber) and one or more powder materials. Backing layer 160 may include substantially any elastomeric polymer material, advantageously with sufficient high temperature resistance for use in downhole applications. Suitable elastomeric polymer materials also advantageously provide sufficient dampening of back reflected ultrasonic energy at downhole temperatures (col. 9, lines 55-64 and col. 10, lines 3-7).

Regarding claims 5 and 21,Yogeswaren discloses measurement tool 100 includes at least one, and preferably three or more, acoustic sensors 120 having a piezo-composite transducer element (not shown in FIG. 2) configured for transmitting and receiving ultrasonic signals.

Regarding claim 23, Yogeswaren discloses barrier layer 360 is fabricated from a titanium disk (col. 13, lines 55-56).

Regarding claim 25, Yogeswaren discloses the controller 130 may also be The controller 130 may also be disposed to be in electronic communication with various sensors and/or probes for monitoring physical parameters of the borehole, such as a

gamma ray sensor, a depth detection sensor, or an accelerometer, gyro or magnetometer to detect azimuth and inclination (col. 5, lines 48-53). In addition, Yogeswaren discloses measurement tool 100 includes at least one acoustic sensor 120 having a piezo-composite transducer element 140. A composite material is generally defined as a synthetically produced material including two or more dissimilar components to achieve a property or properties that are in at least one sense superior to that of any of the constituent components (col. 5, lines 62-67 and col. 9, lines 55-64).

5. Claims 1, 11-12, 14, 17-18, and 20, 50-51 are rejected under 35 U.S.C. 102(b) as being anticipated by Chung et al. (US Patent Re. 33,837).

Regarding claim 1, Chung discloses a chamber (12) for holding the fluid (14);

a transmitter (26) positioned within the chamber (12) for transmitting an acoustic signal through the fluid (14);

a reflector (76) positioned within the fluid (14) for reflecting the acoustic signal;

and a receiver (25, see: col. 5, line 35 and col. 8, lines 19-23) positioned within the chamber (12) for detecting a reflection of the acoustic signal;

wherein said apparatus is incorporated in a downhole sampling (col. 4, lines 28-31).

Regarding claim 14, it is similar in scope with claim 1 and therefore, it is rejected for the reasons set forth for that claim. Furthermore, Chung discloses cylindrical rod 66 to meet the limitations of the first piston.

Regarding claim 20, it is similar in scope with claim 1 and therefore, it is rejected for the reasons set forth for that claim. Furthermore, Chung discloses a subsurface

formation 10 to be investigated is traversed by a well borehole 12 typically containing a fluid 14. A logging sonde 16 is provided which is adapted to be moved vertically along the borehole 12 to the desired borehole elevation at which the formation is to be investigated (col. 4, lines 28-36).

Regarding claims 11 and 17, Chung discloses Chung discloses permanent magnets 120 and 122 are shown disposed within and carried by reflector 76 (col. 6, lines 30-31).

Regarding claims 12 and 18, Chung discloses upon striking the reflector 76, the wave will be reflected as wave 30 at a .theta. angle 34 relative the plane which includes to horizontal reference line 32 and is normal to central axis 28. Furthermore, Chung discloses the reflector 76 is preferably constructed of an efficient acoustic reflector material such as aluminum or steel to maximize transfer of energy from the reflector to the formation (col. 8, lines 19-34).

Claim Rejections - 35 USC § 103

6. Claims 2-10, 14-15, 22, 43-47 and 66-75 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yogeswaren (US Patent 7,075,215 B2) in view of Schuttle (US Patent 5,494,102).

Regarding claims 2-3, 6, 14-15, 64-65 and 73-75, Yogeswaren does not disclose a piston mounted within the chamber near the first end for supporting the transducer within the fluid. Schulte discloses an elongate hollow tubular piston rod 70 is slidably received through the bore 30 and seal assembly 32 in the upper cylinder head 11, the bore 37 and seal assembly 39 in the guide member 34, and the bore 48 and seal

assembly 50 in the valve housing 45 (see: col. 6, lines 48-62). Schuttle further discloses one or more fluid motors of nearby wells (claim 3 and 66), (see: col. 12, line 63). It would have been obvious to one having ordinary skill in the art at the time of the invention to utilize in Yogeswaren the piston of Schuttle because the tubular piston rod has a central bore in fluid communication at its upper end with the bore of the discharge tube and an externally threaded bottom and a bore extends laterally through the side wall of the piston rod at a location beneath the bottom end of the guide member in order to allow fluid and gas communication between the central bore of the piston rod and the intermediate fluid and gas collection chamber between the bottom end of the guide member and the top of the valve housing thereby, making the above combination more effective.

Regarding claim 14, it is similar in scope with claim 1 and therefore, it is rejected for the reasons set forth for that claim. Furthermore, the limitation of piston is already discussed in paragraph 5.

Regarding claims 66 and 68, they are similar in scope with claims 1 and 14 and therefore, it is rejected for the reasons set forth for these claims. Furthermore, the limitations of piston and servomotor are already discussed in paragraph 5.

Regarding claims 7, 44 and 71, Yogeswaren discloses controller 130 typically includes conventional electrical drive voltage electronics (e.g., a high voltage, high frequency power supply) for applying a waveform (e.g., a square wave voltage pulse) to the piezo-composite transducer 140, which causes the transducer to vibrate and thus launch a pressure pulse into the drilling fluid (col. 5, lines 27-33).

Regarding claim 8 and 45 Yogeswaren does not disclose an oscilloscope (microprocessor) connected to the square-wave pulsar/receiver for imaging the reflection of the acoustic signal. Note that Yogeswaren discloses the receiving electronics may also include other circuit components for processing the return signal. In addition, Yogeswaren discloses a suitable controller 130 might further include a programmable processor (not shown), such as a microprocessor or a microcontroller, and may also include processor-readable or computer-readable program code embodying logic, including instructions for controlling the function of the acoustic sensors 120. It would have been obvious to one having ordinary skill in the art at the time of the invention to be motivated to recognize to use a monitor or a display device with the microprocessor in order to imaging the reflected signals thereby providing visual analysis of the processed signals and making the above combination more effective, convenient and useful.

Regarding claims 9, and 46-47 Yogeswaren discloses barrier layer 360 is fabricated from a titanium disk (col. 1, lines 3, lines 55-56).

Regarding claims 35-36, 38-39, Yogeswaren discloses backing layer 160 may include substantially any elastomeric polymer material, advantageously with sufficient high temperature resistance for use in downhole applications. Suitable elastomeric polymer materials also advantageously provide sufficient dampening of back reflected ultrasonic energy at downhole temperatures. Natural rubbers, for example, typically provide sufficient dampening of ultrasonic energy at low temperatures (col. 9, lines 55-65).

Regarding claim 67, Yogeswaren discloses a conduit for the flow of of drilling fluid downhole (col. 4, line 50).

Regarding claim 69, Yogeswaren discloses with continued reference to FIG. 7, backing layer 160 typically includes a composite material having a mixture of one or more elastomeric polymer materials (e.g., rubber) and one or more powder materials. Backing layer 160 may include substantially any elastomeric polymer material, advantageously with sufficient high temperature resistance for use in downhole applications. Suitable elastomeric polymer materials also advantageously provide sufficient dampening of back reflected ultrasonic energy at downhole temperatures (col. 9, lines 55-64 and col. 10, lines 3-7).

Regarding claims 43, 70 and 72, Yogeswaren discloses measurement tool 100 includes at least one, and preferably three or more, acoustic sensors 120 having a piezo-composite transducer element (not shown in FIG. 2) configured for transmitting and receiving ultrasonic signals.

7. Claims 1-6, 19-22, 25, 35-39, 41-42, 43 are rejected under 35 U.S.C. 103(a) as being unpatentable over Goodwin et al. (US Patent 6,490,916 B1) in view of Cosentino (US Patent 4,142,414).

Regarding claims 1 and 14, Goodwin discloses an apparatus (see: Fig. 10) for acoustically analyzing a fluid comprising:

a chamber (sample bottle 300) for holding the fluid :

a transmitter (322) positioned within the chamber (300) for transmitting an acoustic signal through the fluid;

and a receiver (322) positioned within the chamber (2) for detecting a reflection of the acoustic signal;

wherein said apparatus is incorporated in a downhole sampling (the sample bottle can be used either downhole, as part of a downhole sampling tool, or on the surface, see: col. 11, lines 4-6). Although Goodwin discloses cavitation and the formation of bubbles can be determined by one or more of the following methods, passive emissions, transmission, reflection, etc., it does not specifically disclose a reflector (324) positioned within the fluid for reflecting the acoustic signal. Cosentino discloses a movable reflector or a reflector material (see: col. 1, lines 46-47). It would have been obvious to one having ordinary skill in the art at the time of the invention to utilize in Goodwin the reflector of Cosentino because the reflected sound waves are picked up by a receiver and the determined Doppler shift is used for determining the velocity of flow of the fluid thereby, making the above combination more effective.

Regarding claim 14, it is similar in scope with claim and therefore, it is rejected for the reasons set forth for that claim.

Regarding claim 20, it is similar in scope with claims 1 and 20 and therefore, it is rejected for the reasons set forth for that claim. Furthermore, Goodwin in view of Cosentino discloses production tubing 204 is shown penetrating land surface 202, and down through to the reservoir 206, see: col. 6, lines 17-19); and under in-situ conditions (real-time monitoring);

Regarding claims 2 and 15, Goodwin in view of Cosentino discloses the chamber (300) comprises a sealed first end (302) a piston slidably (movable piston 320) within a

second end of the chamber (300) and a conduit (fluid inlet 318) for introducing the fluid into the chamber (300).

Regarding claims 3-4, Goodwin in view of Cosentino discloses a servomotor (piezoelectric crystals 340). Goodwin further discloses when detecting bubble point pressure, the sample fluid is inserted from inlet line 314 through valve 312. If there is a great difference between the pressure of the fluid and the expected bubble point pressure, the pressure can be altered using the hydraulic system so as to bring the pressure of the fluid to within the range of the bubble point pressure. Preferably the pressure of the fluid is within the range of pressure generating capabilities of the acoustic transducer. The steps illustrated in FIG. 8 then can be used to detect the bubble point pressure either in a burst or continuous mode (see: col. 11, lines 7-16). Goodwin further discloses a series of sensors are normally used that determine pressure, temperature, flow rate, and physical properties of the reservoir fluid combined with one or more valves or chokes (col. 6, lines 6-12).

Regarding claims 5, 21, and 43, 72-75 Goodwin in view of Cosentino discloses transducer 322 for generating and detecting the presence of bubbles in the fluid. Goodwin further discloses there are many types of acoustic transducers that can be used for this purpose ranging from capacitive to piezoelectric devices. In addition, Goodwin discloses bubbles generated by transducer 150 could be detected with bubble detection transducers 156, which are preferably located up and down stream of point 158. However, according to a preferred embodiment, the same transducer used

to form the bubbles could be used for bubble detection. Goodwind further discloses a movable piston 320.

Regarding claim 6, Goodwin in view of Cosentino discloses a piston 320 mounted within the chamber 300.

Regarding claim 22, Goodwin in view of Cosentino discloses although sensors 220 are shown in the production zone (col. 6, lines 31-32.

Regarding claim 25, Goodwin in view of Cosentino discloses advantageously, the arrangement shown in FIG. 6 can also be used for acoustic wave time-of-flight and impedance measurements to provide flow rate, sound speed, viscosity and density (see: col. 9, lines 16-19 and col. 7, lines 10-14).

Regarding claim 34, the reflector of Cosentino is also substantionally stationary since it moves based on Doppler shift.

Regarding claims 35-36, 38-39, 41-42 as discussed in paragraph 8 above, Cosentino discloses a movable reflector.

Regarding claim 37, Goodwin in view of Cosentino discloses the sample bottle can be used either downhole, as part of a downhole sampling tool, or on the surface, see: col. 11, lines 4-6).

Regarding claim 49, Goodwin in view of Cosentino discloses the preferred method of determining the pressure applied to the fluid is by using finite difference methods to solve the equations for acoustic propagation related to intensities of waves traveling through different media. The physical properties (such as speed of sound viscosity and density) of the materials used to construct the transducer, the fluid

surrounding it, and the physical dimensions are preferably used as inputs to a suitable program for finite element solutions to propagation of acoustic waves. The acoustic impedance of a material is defined as the product of its mass density and sound speed. In one implementation of the invention, the acoustic impedance of the transducer is approximately matched to the acoustic impedance of the fluid, in the absence of bubbles. At the first appearance of a bubble, both the density and the sound speed of the fluid decrease (col. 8, linss 25-35).

Regarding claims 64-65, Goodwin in view of Cosentino discloses a static piston 320.

Regarding claim 66, it is similar in scope with claim 1/2/3. Therefore, it is rejected for the reasons set forth for that claim.

Regarding claim 67, Goodwin in view of Cosentino discloses a conduit (fluid inlet 314)..

Regarding claim 68, Goodwin in view of Cosentino discloses piezoelectric crystal 340.

Regarding claim 69, Goodwin in view of Cosentino discloses when detecting bubble point pressure, the sample fluid is inserted from inlet line 314 through valve 312. If there is a great difference between the pressure of the fluid and the expected bubble point pressure, the pressure can be altered using the hydraulic system so as to bring the pressure of the fluid to within the range of the bubble point pressure. Preferably the pressure of the fluid is within the range of pressure generating capabilities of the acoustic transducer. The steps illustrated in FIG. 8 then can be used

to detect the bubble point pressure either in a burst or continuous mode (see: col. 11, lines 7-16). Goodwin further discloses a series of sensors are normally used that determine pressure, temperature, flow rate, and physical properties of the reservoir fluid combined with one or more valves or chokes (col. 6, lines 6-12).

Allowable Subject Matter

8. Claims 49-63 are allowable over the prior art of record.

9. Claims 13, 19, 26-30, 40 and 48 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jacques M. Saint-Surin whose telephone number is (571) 272-2206. The examiner can normally be reached on Mondays to Fridays between 10:30 A.M and 800 P.M..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Hezron Williams can be reached on (571) 272-2208. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Jacques M. Saint-Surin
April 29, 2006